

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): An authentication method for a wireless LAN (local area network) system, comprising:

transmitting an authentication request from a STA (terminal station) to an AP (access point), wherein said authentication request comprises a request from said STA to connect with said LAN;

requesting authentication of said authentication request from said AP to an authentication server, by converting said authentication request to a protocol adaptable to said authentication server;

if no problem occurs at hardware or software of said authentication server, checking said authentication request at said authentication server based on a MAC (media access control) address of said STA;

executing encryption authentication at said AP with said STA based on a designated encryption algorithm; and

if no problem occurs at hardware or software of said authentication server, notifying an authentication completion from said authentication server to said AP, after said authentication server received a response of a completion of said encryption authentication from said AP.

2. (previously presented): An authentication method for a wireless LAN system in accordance with claim 1, wherein after said encryption authentication is normally completed, a table of said MAC address in said AP is renewed by an instruction from said authentication server.

3. (currently amended): An authentication method for a wireless LAN system in accordance with claim 1, wherein said AP stores said MAC address of said STA, and
wherein, in case that when a problem occurs at in hardware or software of said
authentication server, said AP itself executes authentication of said STA based on said MAC
address of said STA.

4. (previously presented): An authentication method for a wireless LAN system in accordance with claim 1, wherein said encryption algorithm uses a shared key having a predetermined usable period.

5. (previously presented): An authentication method for a wireless LAN system in accordance with claim 4, wherein in case that said predetermined usable period of said shared key expired, said MAC address is authenticated by an open system authentication method; and
wherein at said open system authentication method, after association, a period of communication is limited to a designated short time, and a key is transported in said limited time

by using such an Internet Key Exchange method of Public Key Infrastructure, and said authentication request is executed again by using said shared key.

6. (currently amended): An authentication apparatus for a wireless LAN system, comprising:

plural STAs;

plural APs which connect to an authentication server and said plural STAs, and one of said plural APs receives an authentication request from one of said plural STAs and converts said authentication request from one of said plural STAs to a protocol adaptable to said authentication server, and authenticates said authentication request from one of said plural STAs based on a designated encryption algorithm; and

said authentication server which, if no problem occurs at hardware or software of said authentication server, -checks said authentication request from one of said STAs based on a MAC address of one of said plural STAs by receiving said converted authentication request, and notifies an authentication completion to said AP, after said authentication server received a response of a completion of encryption authentication from said AP;

wherein said authentication request comprises a request from one of said plural STAs to connect with said LAN.

7. (currently amended): An authentication apparatus for a wireless LAN system in accordance with claim 6, further comprising:

a renewing means ~~for renewing~~ which renews a table of said MAC address in said AP by an instruction from said authentication server, after said encryption authentication is normally completed.

8. (currently amended): An authentication apparatus for a wireless LAN system in accordance with claim 6, wherein said AP stores a MAC address of said one of said STAs, and wherein in case that a problem occurs at hardware or software of said authentication server, said AP itself executes authentication of said one of said STAs based on said MAC address of said one of said STAs.

9. (previously presented): An authentication apparatus for a wireless LAN system in accordance with claim 6, wherein said authentication algorithm is a WEP (wired equivalent privacy) algorithm stipulated in the IEEE 802.11.

10. (previously presented): An authentication apparatus for a wireless LAN system in accordance with claim 6, wherein said encryption algorithm uses a shared key having a predetermined usable period.

11. (previously presented): An authentication apparatus for a wireless LAN system in accordance with claim 10, wherein in case that said predetermined usable period of said shared key expired, said MAC address is authenticated by an open system authentication method; and

wherein at said open system authentication method, after association, a period of communication is limited to a designated short time, and a key is transported in said limited time by using such an Internet Key Exchange method of Public Key Infrastructure, and said authentication request is executed again by using said shared key.

12. (currently amended): A wireless and fixed-line interface apparatus comprising:
a first authentication part ~~for which executing~~executes an authentication based on a first information certificate provided by a terminal;

a second authentication part ~~for which executing~~executes an authentication based on a second information certificate provided by said terminal;

a storing part ~~for which storing~~stores said second information certificate, which is used for authenticating said terminal; and

a communication part ~~for which communicating~~communicates with an authentication server;

wherein said communication part requests from said authentication server an authentication based on said second information certificate, and

said second authentication part executes an authentication in accordance with a response from said authentication server.

13. (currently amended): An access point in a wireless LAN system comprising:

- a first authentication part ~~for which executing~~executes an authentication based on a first information certificate provided by a terminal;
- a second authentication part ~~for which executing~~executes an authentication based on a second information certificate provided by said terminal;
- a storing part ~~for which storing~~stores said second information certificate, which is used ~~for to authenticating~~authenticate said terminal; and
- a communication part ~~for which communicating~~communicates with an authentication server,

wherein said communication part requests from an authentication server an authentication based on said second information certificate, and

according to a response from said authentication server, said second authentication part determines whether to permit, or not to permit, said terminal to connect with a network.

14. (currently amended): An access point apparatus comprising:

- a first authentication part ~~for which executing~~executes an encrypted authentication of a terminal; and
- a second authentication part ~~for which executing~~executes a MAC address authentication of said terminal, using information about a MAC address, which is possessed by an authentication server,

wherein said access point stores a MAC address of said terminal, and

wherein when a failure occurs at hardware or software of said authentication server, said access point apparatus itself executes authentication of said terminal based on a MAC address of said terminal.

15. (currently amended): An access point apparatus comprising:

a first authentication part ~~for which executing~~executes an encrypted authentication of a terminal;

a second authentication part ~~for which executing~~executes a MAC address authentication of said terminal; and

a storing part ~~for which storing~~stores a MAC address, which is used ~~for to~~
~~executing~~execute a MAC address authentication of said terminal,

wherein when a connection request is issued from said terminal, said second authentication part authenticates said terminal, using said MAC address stored by said storing part and using information possessed by an authentication server, which issues permission ~~for to~~
~~establishing~~establish a connection.

16. (currently amended): An access point apparatus comprising:

an authentication part ~~for which executing~~executes an encrypted authentication of a terminal;

a communication part ~~for which communicating~~communicates with an authentication server which manages the MAC address of said terminal; and

a connection control part ~~for which controlling controls~~ a connection of said terminal to a network,

wherein when an authentication request is issued from said terminal:

said authentication part authenticates said terminal;

said communication part sends the MAC address of said terminal to said

authentication server and receives a result of a MAC address

authentication performed by said authentication server; and

said connection control part permits said terminal to connect with a network when

said MAC address authentication succeeds, and does not permit said

terminal to connect with a network when said MAC address authentication fails.

17. (currently amended): An access point apparatus comprising:

an authentication part ~~for which executing executes~~ an encrypted authentication of a terminal;

a communication part ~~for which querying queries~~ an authentication server about a MAC address of said terminal;

a connection control part ~~for which allowing allows~~ said terminal to connect with a network when a MAC address of said authentication server coincides with that of said terminal,

wherein said access point stores said MAC address of said terminal, and

wherein when a failure occurs at hardware or software of said authentication server, said access point apparatus itself executes authentication of said terminal based on said MAC address of said terminal.

18. (currently amended): An access point apparatus comprising:

a first authentication part ~~for which performing~~performs an encrypted authentication of a terminal using a WEP algorithm; and

a second authentication part ~~for which performing~~performs a MAC address authentication of said terminal,

wherein when an authentication request is issued by said terminal, an authentication is performed by said first authentication part and said second authentication part, and

communication is established with an authentication server, which determines whether to permit, or not to permit, said terminal to connect with a network according to said MAC address of said terminal.

19. (currently amended): An access point apparatus comprising:

a first authentication part ~~for which performing~~performs an encrypted authentication of a terminal using a WEP algorithm;

a second authentication part ~~for which performing~~performs a MAC address authentication of said terminal; and

a storing part ~~for which storing~~stores a MAC address of said terminal,

wherein when a connection request is issued from said terminal, said first authentication part and said second authentication part perform authentications, and said second authentication part also uses MAC address stored in an authentication server, and

wherein, when a failure occurs at hardware or software of said authentication server, said access point apparatus itself executes authentication of said terminal based on said MAC address of said terminal.

20. (currently amended): An access point apparatus in a wireless LAN system comprising:

a first authentication part ~~for which executing~~ executes at least one of an encrypted authentication and an open system authentication of a terminal; and

a second authentication part ~~for which executing~~ executes an authentication of said terminal using information of a MAC address of said terminal,

wherein said second authentication part also uses MAC address stored in an authentication server, which manages MAC addresses of terminals placed in one wireless LAN system, in executing an authentication of said terminal, and

wherein, when a failure occurs at hardware or software of said authentication server, said access point apparatus itself executes authentication of said terminal based on said MAC address of said terminal.

21. (currently amended): A wireless LAN system comprising
a terminal
an access point apparatus; and
an authentication server,

wherein said terminal comprises a communication part ~~for which~~ wirelessly
~~communicating~~communicates with said authentication server,

wherein said access point apparatus comprises:

a first authentication part ~~for which~~ ~~executing~~executes an encrypted authentication of a
said terminal and a second authentication part ~~for which~~ ~~executing~~executes a MAC address
authentication of said terminal, ~~and~~

wherein said authentication server comprises a storing part ~~for which~~ ~~storing~~stores a
MAC address of a said terminal and a responding part ~~for which~~ ~~responding~~responds to an
inquiry of said access point apparatus about a MAC address, and

wherein, when a failure occurs at hardware or software of said authentication server, said
access point apparatus itself executes authentication of said terminal based on said MAC address
of said terminal.

22. (currently amended): A wireless LAN system comprising
a terminal;
an access point apparatus; and
an authentication server,

wherein said terminal comprises a communication part ~~for which~~ wirelessly
~~communicating~~ communicates with said access point apparatus,

wherein said access point apparatus performs an encrypted authentication of ~~a~~ said
terminal and performs a MAC address authentication of said terminal,

wherein said authentication server stores a MAC address of said terminal and supports
the MAC address authentication with the stored MAC address, and

wherein, when a failure occurs at hardware or software of said authentication server, said
access point apparatus itself executes authentication of said terminal based on said MAC address
of said terminal.

23. (currently amended): A wireless LAN system comprising:

a terminal;

an access point apparatus; and

an authentication server,

wherein said terminal comprises a communication part ~~for which~~ wirelessly
~~communicating~~ communicates with said access point apparatus,

wherein said access point apparatus comprises an authentication part ~~for which~~
~~performing~~ performs a MAC authentication of said terminal,

wherein said authentication server, which is placed in one wireless LAN system,
comprises a storing part ~~for which~~ storing stores a MAC address of said terminal and a

responding part ~~for which responding~~responds to an inquiry from said access point apparatus about MAC address, and

wherein, when a failure occurs at hardware or software of said authentication server, said access point apparatus itself executes authentication of said terminal based on said MAC address of said terminal.

24. (previously presented): An authentication server used in a wireless LAN system, comprising:

plural STAs;

plural APs which connect to an authentication server and said plural STAs, and one of said plural APs receives an authentication request from one of said plural STAs and converts said authentication request from one of said plural STAs to a protocol adaptable to said authentication server, and authenticates said authentication request from one of said plural STAs based on a designated encryption algorithm; and

said authentication server which checks said authentication request from one of said STAs based on a MAC address of one of said plural STAs by receiving said converted authentication request, and notifies an authentication completion to said AP, after said authentication server received a response of a completion of encryption authentication from said AP,

wherein said encryption algorithm uses a shared key having a predetermined usable period,

wherein in case that said predetermined usable period of said shared key expired, said MAC address is authenticated by an open system authentication method; and

wherein at said open system authentication method, after association, a period of communication is limited to a designated short time, and a key is transported in said limited time by using such an Internet Key Exchange method of Public Key Infrastructure, and said authentication request is executed again by using said shared key.

25. (currently amended): An authentication server used in a wireless or a fixed-line interface apparatus comprising:

a first authentication part ~~for which executing~~executes an authentication based on a first information certificate provided by a terminal;

a second authentication part ~~for which executing~~executes an authentication based on a second information certificate provided by said terminal;

a storing part ~~for which storing~~stores said second information certificate, which is used ~~for to authenticating~~authenticate said terminal; and

a communication part ~~for which communicating~~communicates with an authentication server;

wherein said communication part requests from said authentication server an authentication based on said second information certificate, and

said second authentication part executes an authentication in accordance with a response from said authentication server.

26. (previously presented): A terminal used in a wireless LAN system comprising:
plural STAs;

plural APs which connect to an authentication server and said plural STAs, and one of said plural APs receives an authentication request from one of said plural STAs and converts said authentication request from one of said plural STAs to a protocol adaptable to said authentication server, and authenticates said authentication request from one of said plural STAs based on a designated encryption algorithm; and

said authentication server which checks said authentication request from one of said STAs based on a MAC address of one of said plural STAs by receiving said converted authentication request, and notifies an authentication completion to said AP, after said authentication server received a response of a completion of encryption authentication from said AP,

wherein said encryption algorithm uses a shared key having a predetermined usable period,

wherein in case that said predetermined usable period of said shared key expired, said MAC address is authenticated by an open system authentication method; and

wherein at said open system authentication method, after association, a period of communication is limited to a designated short time, and a key is transported in said limited time by using such an Internet Key Exchange method of Public Key Infrastructure, and said authentication request is executed again by using said shared key.

27. (currently amended): A terminal used in a wireless or a fixed-line interface apparatus comprising:

a first authentication part ~~for which executing~~executes an authentication based on a first information certificate provided by a terminal;

a second authentication part ~~for which executing~~executes an authentication based on a second information certificate provided by said terminal;

a storing part ~~for which storing~~stores said second information certificate, which is used ~~for to authenticating~~authenticate said terminal; and

a communication part ~~for which communicating~~communicates with an authentication server;

wherein said communication part requests from said authentication server an authentication based on said second information certificate, and

said second authentication part executes an authentication in accordance with a response from said authentication server.

28. (previously presented): A method for authenticating a terminal in a wireless LAN system including a terminal, an access point apparatus, and an authentication server, comprising:

performing, by said access point apparatus, an encrypted authentication and a MAC address authentication of said terminal when an authentication request is issued from said terminal;

inquiring, by said access point apparatus, to said authentication server whether said terminal is permitted, according to a MAC address, to communicate;

performing, by said access point apparatus, a MAC address authentication of said terminal according to a response to said inquiry.

29. (currently amended): A method for authenticating a terminal in a wireless LAN system comprising:

performing, by an access point apparatus, an encrypted authentication of a terminal when an authentication request is issued from said terminal;

performing a MAC address authentication of said terminal with the MAC address information that an authentication server manages; ~~and~~

storing a MAC address of said terminal in said access point apparatus; and

when a failure occurs at hardware or software of said authentication server, executing authentication of said terminal based on said MAC address of said terminal by access point apparatus itself.

30. (previously presented): An authentication method for a wireless LAN system in accordance with claim 1, wherein said authentication request from said STA to said AP comprises a request to establish an authorized connection with said AP for the exchange encrypted data.

31. (previously presented): An authentication method for a wireless LAN system in accordance with claim 1, wherein said authentication server comprises data relating to more than 10,000 MAC addresses.

32. (previously presented): An authentication method for a wireless LAN system in accordance with claim 1, wherein said MAC address is a globally unique hardware identifier, permanently assigned when a device is manufactured.

33. (previously presented): An authentication apparatus for a wireless LAN system in accordance with claim 6, wherein said MAC address is a globally unique hardware identifier, permanently assigned when a device is manufactured.